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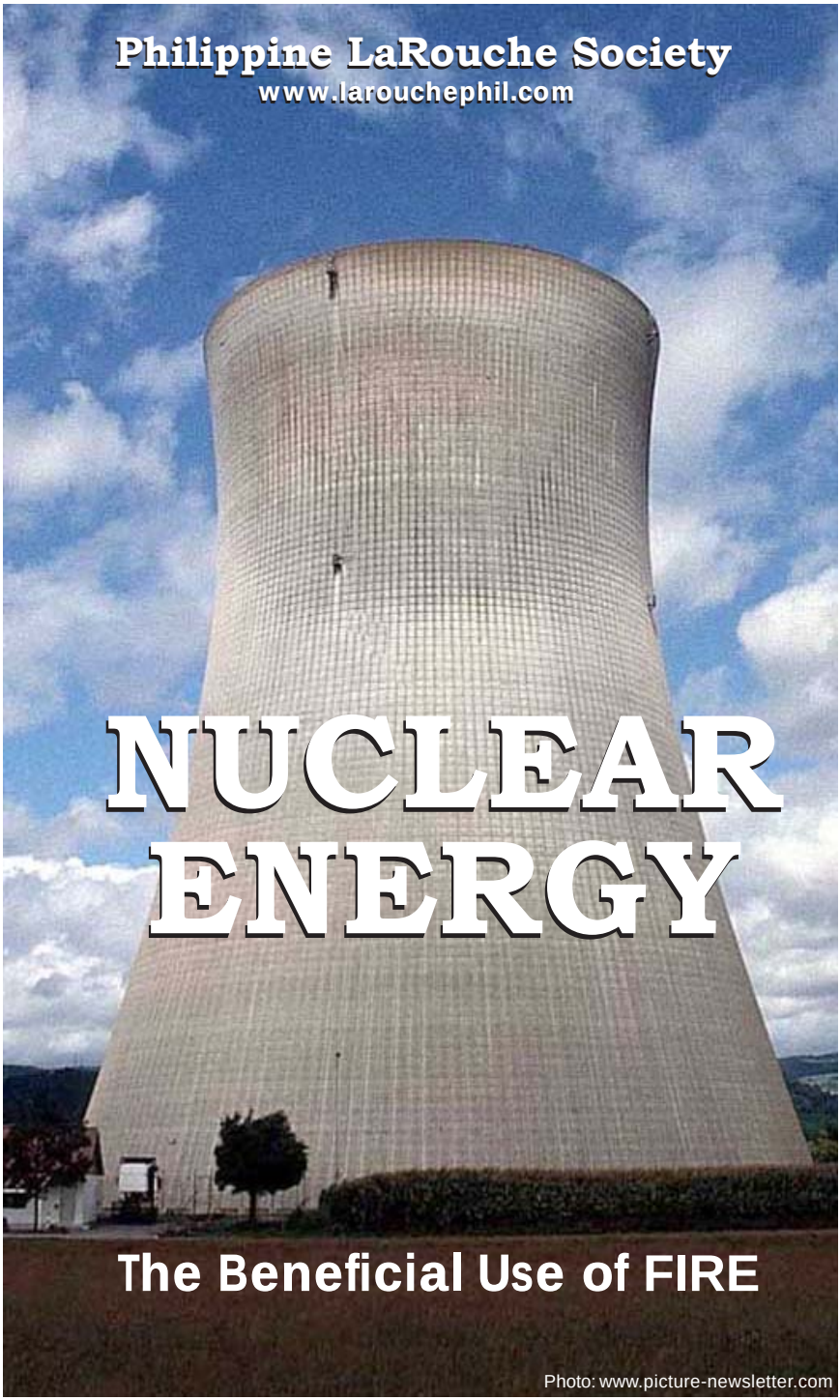
NUCLEAR ENERGY

The Beneficial Use of FIRE



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The mythical Greek god Zeus was known to have disdained the earthly human mortals and denied them knowledge and other divine gifts to keep them in a state of perpetual misery until they died off. He insisted that Prometheus, the rebel god, not intervene in his plan of imposing ignorance and suffering on the primitive inhabitants of the planet. Despite the warnings of Zeus, Prometheus took pity on the mortals and taught them many ways of improving their quality of life, foremost among which was the beneficial use of fire. As the story of Aeschylus goes, he was punished, tied to a rock to be eaten alive by vultures in perpetuity, until he was freed by Heracles twelve generations after.

"The enemy of mankind has been a sense of slavery, the sense of slavery which you can read in the* Prometheus Bound *of Aeschylus. Mankind is forbidden to know how to discover, or use, nuclear fission power: fire. "

—Lyndon H. LaRouche, Jr.

In light of what is generally perceived as an on-going global financial system collapse, and the escalating threats of another global war, resulting from "Zeus'" policies, it is heartening to note that there are still leaders around the world, possessing Promethean virtues of compassion and courage, determined to do what is right, initiating programs for the good of all, and the vision of a better world for the coming generations. It is in this context that we propose to re-introduce you to nuclear power: the way towards world peace and prosperity.

After more than two decades of limited growth in construction of nuclear reactors, and realizing that fossil fuel as a principal source of energy will not sustain the growing demands of modern societies, developed and developing nations alike have had to reconsider their decision to shelve plans of utilizing nuclear energy as an efficient source of power. Technological advancement and ferreting out anti-nuclear propaganda to allow results of credible investigations to surface in regard to the Chernobyl and three-mile island incidents in the '80s convinced current and enlightened leaders of many nations of the necessity of this vital energy source.

On virtually every continent in the world, nations are making that determination that 'the future is nuclear'. In an article with that title, Russian academician and renowned physicist Yevgeny Velikhov stated, "Nuclear power engineering is capable of assuring all those who are not certain of having sufficient energy today and tomorrow.

"We are prepared to support expansion of nuclear energy** [worldwide-ed.] **in the following ways...Facilitating and supporting financing to aid construction of nuclear power plants...Providing nuclear fuel services, including taking steps to ensure that the commercial nuclear fuel market remains stable and that states are assured of reliable access to nuclear fuel and fuel services for the lifetime of reactors..."

—U.S. President George Bush and Russian Federation President Vladimir Putin, Declaration on Nuclear Energy and Nonproliferation, July 3, 2007

There is no doubt it is the only source of energy that can ensure the world's steady development in the foreseeable future."

The dramatic shift in international energy policy that is under way is evident in nations that had planned nuclear power generation programs in the past, but abandoned them, or were not able to succeed, in operating them. In the Philippines, the mothballing of the Bataan nuclear power plant, a costly political decision made by two successive administrations after Marcos, may have set us back some 30 years of industrial development.

Increased Capacity

Increased nuclear capacity in some countries is resulting from the upgrading of existing plants. This is a highly cost-effective way of bringing on new capacity.

Numerous power reactors in USA, Belgium, Sweden and Germany, for example, have had their generating capacity increased. In Switzerland, the capacity of its five reactors has been increased by 12.3%. In the USA, the Nuclear Regulatory Commission has approved 110 uprates totaling 4700 MWe since 1977, a few of them "extended uprates" of up to 20%.

Spain has a program to add to its nuclear capacity through upgrading its nine reactors by up to 13%.

Finland has boosted the capacity of the Olkiluoto plant by 29% to 1700 MWe. It is now licensed to operate to 2018.

Sweden is uprating Forsmark plant by 13% over 2008-10 at a cost of EUR 225 million, and Oskarshamn-3 by 21% at a cost of EUR 180 million.

Nuclear Plant Construction

Most reactors currently planned are in the Asian region, with fast-growing economies and rapidly rising electricity demand.

At least twelve countries with existing nuclear power programs (Bulgaria, Canada, France Russia, China, India, Pakistan, Japan, Romania, Slovakia, South Korea, South Africa and USA) have plans to build new power reactors beyond those now under construction, or expand the capacities of those presently operating.

In all, over 70 power reactors with a total net capacity of over 80,000 MWe are planned and over 150 more are proposed. Rising gas and oil prices resulting from speculation in the Commodity Futures Market and greenhouse constraints on coal have combined to put nuclear power back on the agenda for projected new capacity in Europe, Asia and the Americas.

Questions have been raised about the potential rate of construction of new plants. However, half (218) the number of nuclear reactors operating today started up in the decade 1980 to 1989 — an average of one every 17 days. Under similar conditions two and a half decades ago, it is not hard to imagine a similar number being commissioned between now and 2015.

Table 1. Nuclear Units Under Construction Worldwide

Country	Units	Total MWe
Argentina	1	692
Bulgaria	2	1,906
China	5	4,220
China, Taiwan	2	2,600
Finland	1	1,600
India	6	2,910
Iran	1	915
Japan	1	866
Pakistan	1	300
Romania	1	655
Russia	7	4,585
S. Korea	1	960
Ukraine	2	1,900
Total	31	24,109

Source: International Atomic Energy Agency PRIS database.
Updated: 5/07/07 by Nuclear Energy Institute, http://www.nei.org

As of August 2007, there are new nuclear power initiatives across Eurasia; countries such as Myanmar, Indonesia, Thailand, Vietnam, Bangladesh, Poland, Armenia, Belarus, Egypt, Jordan, Saudi Arabia, Yemen, South Africa, Angola, Namibia, Brazil, Venezuela, Mexico, Germany, Italy, Scandinavia; and many are in conjunction with Russia, China, or India. Visit www.larouchepac.com for more information.

The 1980s figures included 47 in USA, 42 in France and 18 in Japan. However, many other countries are now feverishly constructing plants, led by Russia, China, and India. Developing countries such as Vietnam, Indonesia and Bangladesh, have also started plans to construct nuclear power plants within the next couple of years. Some studies even boldly estimated that if financing and technological assistance were available to developing countries, the construction rate can reach as fast as five nuclear reactors a week.

In the USA, there are proposals for over 20 new reactors and the first combined construction and operating licenses for these will be applied for in 2007. All are for late third-generation plants, and a further proposal is for two ABWR units.

In Finland, construction is now under way on a fifth, very large reactor, which will come on line in 2011.

France is building a similar 1600 MWe unit at Flamanville, for operation from 2012.

Romania's second power reactor started up in 2007, and two further units are expected to commence construction soon.

Bulgaria is about to start building two 1000 MWe Russian reactors at Belene.

In Russia, there are three reactors under active construction and due for completion by 2012, one being a large fast neutron reactor. Three further reactors are then planned to replace some existing plants, and 15 further reactors are planned to add new capacity by 2020. Several small floating power plants are expected to be completed by 2010.

Poland is planning some nuclear power capacity but initially is likely to join a joint project in Lithuania, with Estonia and Latvia.

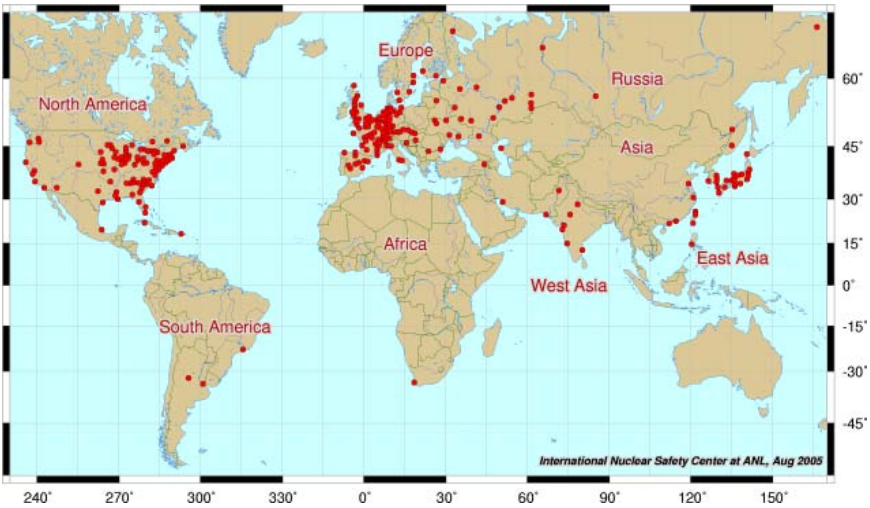
Nuclear power will continue to play a major role in the future electricity supply mix in both South Korea and Japan.

South Korea plans to bring a further eight reactors into operation by the year 2015, giving total new capacity of 9200 MWe. Cost is expected to be US$ 1400 per kilowatt, falling to $1200/kW in later units with 48-month construction time.

Japan has one reactor under construction and another ready to start building. It also has plans and, in most cases, designated sites and announced timetables for a further 10 power reactors, totaling over 13,000 MWe which are expected to come on line 2012-17.

In China, now with eleven operating reactors on the mainland, CNNC is well into the next phase of its nuclear power program. The second of two Russian 1000 MWe Pressurized Water Reactors at Tianwan in Jiangsu province was grid connected in May 2007. China NNC and Guangdong NPC have four more indigenous reactors under construction at Lingdong and Qinshan, and four more large Western third-generation ones are due to start construction at Sanmen and Yangjiang. It aims to quadruple its nuclear capacity from that operating and under construction by 2020.

Figure 1. Nuclear Power Reactors Worldwide



Source: International Nuclear Safety Center, Argonne National Laboratory

As of May 2007, 30 countries are operating 436 nuclear power plants for electricity generation, producing 16% of the world's electricity production in 2006. For an interactive version of this map with more details, see http://www.insc.anl.gov/pwrmaps/map/world_map.php.

In Taiwan, Taipower is building two more advanced Boiling Water Reactors at Lungmen, which are part of the additional seven reactors planned for completion before 2020.

India has six reactors under construction and expected to be completed by 2010. This includes two large Russian reactors and a large prototype fast breeder reactor (FBR) as part of its strategy to develop a fuel cycle that can utilize thorium. Further units are planned.

Pakistan has a second 300 MWe reactor under construction at Chasma, financed by China. There are plans for more Chinese power reactors.

In Kazakhstan, a joint venture with Russia's Atomstroyexport envisages development and marketing of innovative small and medium-sized reactors, starting with a 300 MWe Russian design as baseline for Kazakh units.

In Iran, nuclear power plant construction was suspended in 1979, but in 1995, an agreement was signed with Russia to complete a 1000 MWe PWR at Bushehr. Construction is well advanced.

The Turkish government plans to have three nuclear power plants total 4500 MWe operating by 2012-15, a US$ 10.5 billion investment.

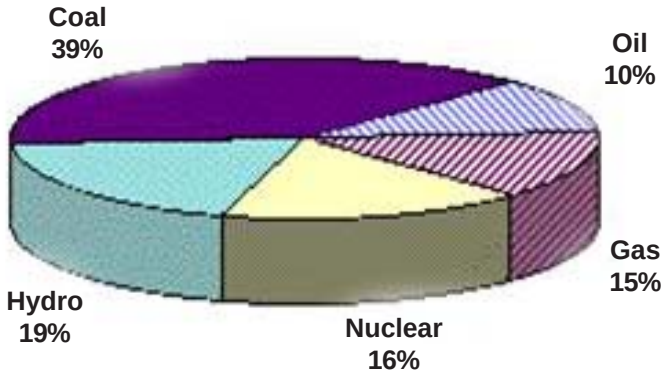
Indonesia plans to start constructing a 2000 MWe nuclear power station in 2010.

Vietnam is also considering its first nuclear power venture, to be commissioned by 2017.

Brazil has decided to construct two nuclear power reactors within this decade.

Bangladesh has just gotten the approval from IAEA to plan a construct their first nuclear power plant.

Figure 2. World Electricity Generation



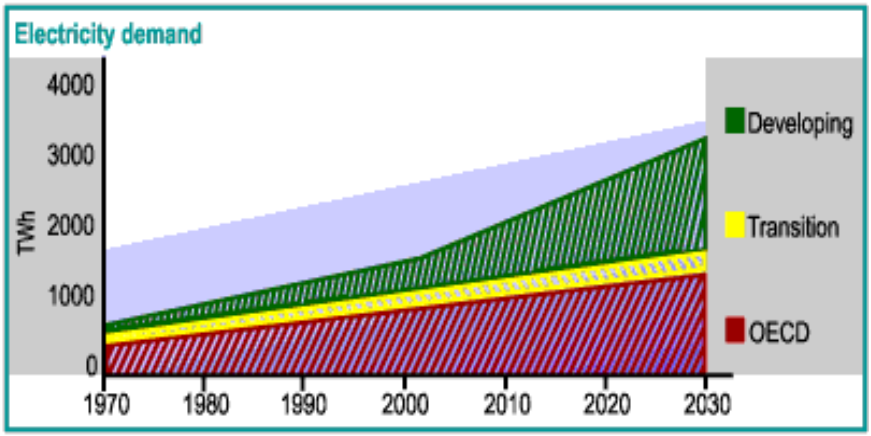
Source: World Nuclear Association, *Nuclear Power in the World Today* (updated June 2007)

Nuclear Power in Brief

Nuclear technology uses the energy produced by splitting the atoms of certain elements. It was first developed in the 1940s and during World War II research initially focused on producing bombs. Their mass destructive effect was demonstrated by President Harry Truman in late 1945, the first and only instance that these weapons were used, killing half a million Japanese.

Subsequently, a wise President of the United States in the 50s, Dwight Eisenhower embarked on an Atoms For Peace program to make nuclear technology available to all countries. Only then did attention turn to peaceful purposes of nuclear fission, notable for power generation. Today, the world produces as much electricity from nuclear energy as it did from all sources combined in 1960. Civil nuclear power can now boast over 12,400 reactor years of experience and supplies 16% of global needs, in 30 countries.

Figure 3. World Energy Demand Outlook



Source: OECD/IEA World Energy Outlook 2004

Today, only eight countries are known to have a nuclear weapons capability. By contrast, 56 operate civil research reactors, and 30 have some 435 commercial nuclear power reactors with a total installed capacity of over 370,000 MWe. This is more than three times the total generating capacity of France or Germany from all sources. Some 30 further power reactors are under construction, equivalent to 6% of existing capacity, while over 60 are firmly planned, equivalent to 18% of capacity.

Sixteen countries depend on nuclear power for at least a quarter of their electricity. France and Lithuania get around three quarters of their power from nuclear energy, while Belgium, Bulgaria, Hungary, Slovakia, South Korea, Sweden, Switzerland, Slovenia, and Ukraine get one third or more. Japan, Germany, and Finland get more than a quarter of their power from nuclear energy, while the USA with 104 functioning reactors, gets one-fifths.

Principally due to prohibitive financing for energy infrastructure and anti-nuclear ideologues, fewer nuclear plants have been built in the 90s up to 2006, than in the 60s, 70s and 80s. Yet, through technology developments in efficiency and safety concerns, those now operating are producing more electricity. In 2005, production was 2626 billion kWh. The increase over the last five years of only two reactors is equal to the output from 30 large new nuclear plants.

World Energy Needs

The World Energy Outlook 2006 from the OECD's International Energy Agency (IEA) highlights the increasing importance of nuclear power in meeting energy needs and achieving security of supply.

If policies remain unchanged, world energy demand to 2030 is forecast to increase by 53%. Over 70% of the increased energy demand is from developing countries, led by China and India.

From 1980 to 2004, total world primary energy demand grew by 54% and it is projected to grow at much the same rate up to 2030. Electricity growth is stronger. Increased demand was most dramatic in developing countries and that is projected to increase.

With the UN predicting world population growth from 6.4 billion in 2004 to 8.1 billion in 2030, demand for energy must increase substantially over that period. Both population growth and increasing standards of living for many people in developing countries will cause strong growth in energy demand, expected to be 1.6% per year, or 53% from 2004 to 2030.

Electricity demand is increasing much more rapidly than overall energy use, and is projected to grow at 2.6% per year to 2030. Currently some 2 billion people have no access to electricity, and it is a high priority to address this lack.

Without nuclear power, the world would have to rely almost entirely on fossil fuels, especially coal, to meet the electricity demands.

Figure 4. *Artist's illustration of the first-ever floating nuclear power plant, designed by Russia.*

Desalination

It is estimated that one fifth of the world's population does not have access to safe drinking water, and that this proportion will increase due to population growth relative to water resources. The worst affected areas are the arid and semi-arid regions of Asia and North Africa.

Many leaders and economists in the South-West Asian region commonly known as the Middle East subscribe to the idea of world-famous statesman and physical economist Lyndon LaRouche, who has proposed that peace and development in the war-torn region will result from focusing on the kind of infrastructure which addresses the critical need of water for its populations, food production, and industrial development, these to be achieved only by immediate construction of nuclear-powered desalination plants strategically located in the region.

Source: India Department of Atomic Energy

Figure 5. Nuclear Desalination plant at Kalpakkam, Tamil Nadu, India

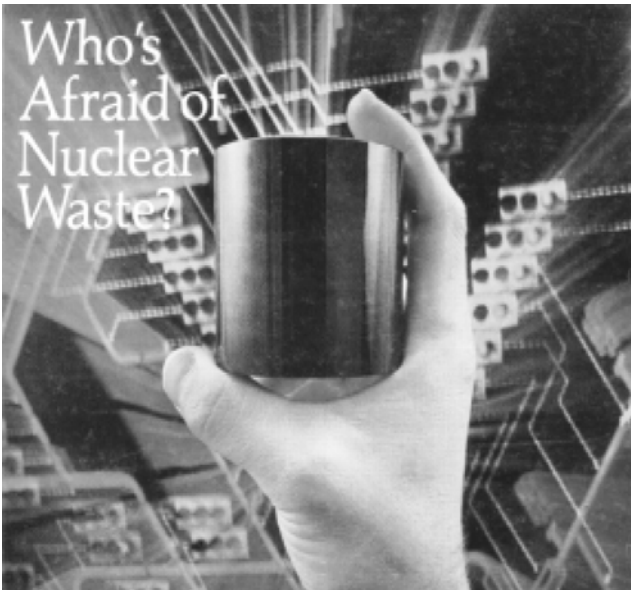
Most desalination today uses fossil fuels. Total world capacity is approaching 30 million cubic meters/day of potable water, in some 12,500 plants. Half of these are in the Middle East. The largest produces 454,000 cubic meters/day.

India has recently announced that its floating nuclear-powered desalination plant is fully operational. The plant is located about 40km east of Tamil Nadu coast. It is currently producing 100,000 gallons/day and will be upgraded to 1 million gallons/day by 2008. The plant is sitting on a 65 by 16 meter wide barge located in deep sea.

The features of this plant includes bringing in saturated hot steam generated in the nuclear power plant for flash heating the water in a vacuum chamber located on the barge. The freshly generated water vapor passes into an adjacent chamber where cold water drawn from 600 meter depth of Bay of Bengal, by pipe, and wrapped around the cooling chamber converts the water vapor to clean potable water.

The fresh water is then towed in specially developed 50,000-gallon containers by barges for pumping into the water distribution system on shore. The capital cost of the project so far has been $5 million. It is the first of its kind in history.

Other similar nuclear-powered projects are now being developed and built by Spain, the U.K., China, Russia, Pakistan, Tunisia, Morocco, Egypt, Algeria, South Korea, and Argentina.



Battelle Pacific Northwest Laboratories

Figure 6. *A glass cylinder illustrating the total amount of radioactive waste generated for one person if his lifetime electricity needs were supplied by nuclear energy.*

Myths About Nuclear Power

Myth #1: Nuclear Power is dangerous to your health

There has never been any accident in the US that has endangered the health or welfare of the public. The Three Mile Island nuclear plant accident in 1979 injured no one.

In the US, the Nuclear Regulatory Commission provides the standards for reactor design and plant operation, contributing to the excellent nuclear power plant public safety records.

The most famous is the case of Chernobyl plant in Russia in 1986. Investigations since have discovered that the fault lay in poor plant design and inadequate training of personnel.

The new generation of nuclear plant designs, already being built internationally, feature passive safety systems, which simply shut the plant down if there is an operator error or equipment failure.

As far as 'terrorist attacks' are concerned, there is no public infrastructure that is as well protected as nuclear power plants. There is no scenario under which a release of radiation would significantly affect public health.

Myth #2: Radioactive waste from nuclear plants is a health hazard

There is no such thing as nuclear waste. This is a term used by anti-nuclear ideologues to frighten the public, and its elected representatives. More than 95% of the fission products created in commercial power plants can be reprocessed and recycled. The spent fuel from a typical 1000-megawatt nuclear plant, which has operated over 40 years, can produce energy equal to 130 million barrels of oil, 37 million tons of coal.

Today, Britain, France, Russia, India, Japan, and China reprocess spent nuclear fuel, and many other countries are beginning to do the same.

Myth #3: Building nuclear power plants will lead to nuclear weapons

No nation has ever developed a nuclear weapon from a civilian nuclear power plant. If a nation has the intention to develop nuclear weapons, it must obtain the specific technology to do so. Israel is an example of a nation that does not have a civilian nuclear power plant but has developed nuclear weapons.

Myth #4: Nuclear energy is more expensive than fossil or 'alternative' fuels

The radical escalation in the cost of building nuclear power plants in the late 1970s and 1980s was the result of political actions, not economics. Some plants projected to cost less than $1 billion ended up costing three to four times that amount, because of anti-nuclear 'environmentalists', and legal interveners were given free rein, using specious and ideological arguments to delay construction for years, sometimes for decades. Where there has been less political interference, new nuclear power plants have been built in 38 months, on schedule and on budget, such as in Japan, Taiwan, China and India.

Table 2. Comparison of Accident Statistics In Energy Production

Fuel	Immediate Fatalities 1970-1992	Who?	Normalized to Death per TWy electricity
Coal	6400*	Workers	342
Natural Gas	1200	Workers and Public	85
Hydro	4000	Public	883
Nuclear	31	Workers	8

www.world-nuclear.org

***In 2006, more than 5,000 miners died in China during the production of the more than 1 billion tons of coal that power its economy. The health of the public in China's cities is also endangered, by the pollution caused by the burning of fossil fuels.*

Table 3. ESTIMATED ELECTRICAL ENERGY FROM DIFFERENT FUELS

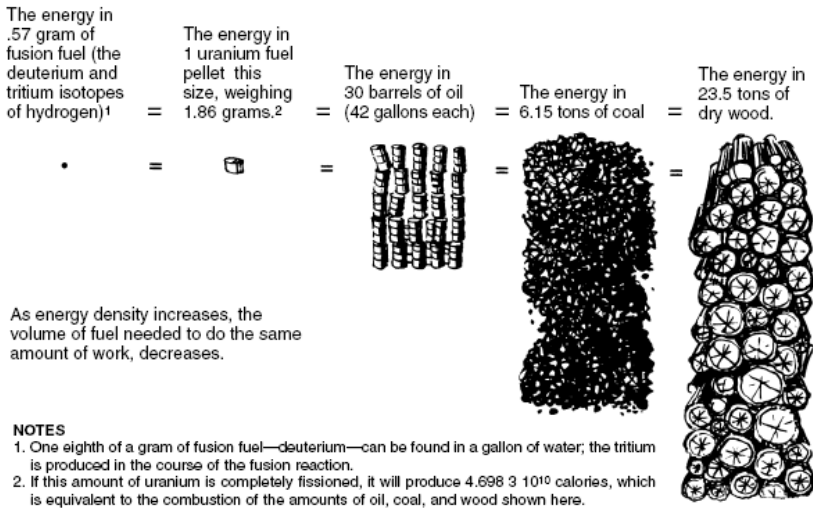
Fuel	KWh of Electricity from 1 kilogram of fuel
Hardwood	1
Coal	3
Heavy Oil	4
Natural Gas	6
Natural Uranium	50,000
Low-enriched Uranium	250,000
Uranium with Reprocessing	3,500,000
Plutonium with Reprocessing	5,000,000

Source: John Sutherland, “Nuclear Cycles and Nuclear Resources,” June 27, 2003.

Figure 7. Fuel and Energy Comparisons

FIGURE 1

Fuel and Energy Comparisons



NOTES

1. One eighth of a gram of fusion fuel—deuterium—can be found in a gallon of water; the tritium is produced in the course of the fusion reaction.
2. If this amount of uranium is completely fissioned, it will produce 4.698 3 10^{10} calories, which is equivalent to the combustion of the amounts of oil, coal, and wood shown here.

Source: Dr. Robert J. Moon, 1985

Stanislav Menshikov

Lyndon H. LaRouche, Jr.

While it does require less up-front capital investment to build a gas-fired power plant than a nuclear plant. The operational cost over the 30-or-more year lifetime of the gas plant swings heavily in favor of nuclear power. And compared to coal, the overall economy is not taxed to transport millions of tons of fuel.

Other renewable energy sources, like solar and wind, are not only inefficient because their energy is so dispersed, they are so unreliable that back up plants must be available for any time it is not sunny or windy. Not only will the public bear the expense of the inefficiency, the entire electric grid system pays the price of having to provide stand-by redundant power-generating capacity to ensure grid reliability.

LaRouche and the Nuclear Renaissance

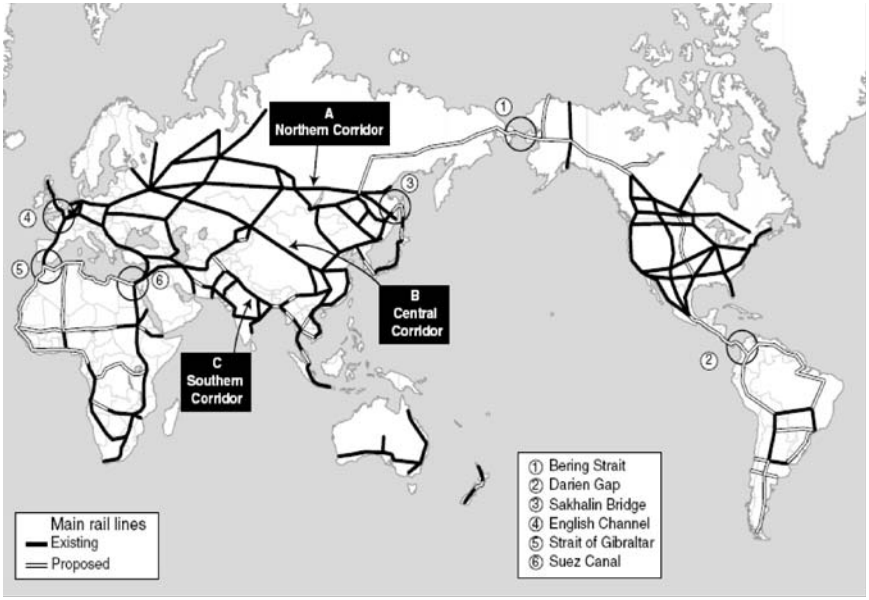
American economist, physicist, and statesman Lyndon LaRouche has been a long-time supporter and advocate of nuclear power, as a means to empowering all nations to be self-sufficient in energy.

He has penned numerous documents, and commissioned several scientific and developmental works on reorganizing this failed monetary and financial system, and a return to the principles of American System of Political Economy as designed by Alexander Hamilton and, who championed technology and agro-industrialization as a means of promoting the principle of general welfare and achieving the common good.

In one of his works, The Eurasian Landbridge Project, LaRouche called for nuclear powered centers or hubs, to provide the energy requirements of industrialized sectors and magnetic levitation trains and other transit systems connecting the continent of Asia to Europe. These hubs would also serve as economic drivers for the cities built around them. Farms, educational institutions, research centers, and whole communities, would have access to efficient, reliable, and safe energy sources.

In recent weeks, momentum has gained on the Bering Strait 50 mile tunnel project, proposed by the government of Russia as an offshoot of the proposed Eurasian Landbridge project, which would connect Asia to North America to complete the vision of great thinkers Lyndon LaRouche of the U.S., Drs. Mendeleyev and Menshikov of the Federation of Russia.

Figure 8. The World Land-Bridge



Source: *Executive Intelligence Review*

www.transrapid.de

Figure 9. *The maglev train from Shanghai to its airport is the only commercially functioning maglev in the world so far, since its operation in January 2004. But a system of cooperation among sovereign nation-states will be linked together largely by maglev or high-speed rail.*

White House photo by Joyce N. Boghosian

FIgure 10. Putin and Bush at Kennebunkport, Maine: July 2nd, 2007 at the "Lobster Summit"

Bush and Putin Endorse Enhanced Nuclear Power for the Developing World

July 7, 2007 (LPAC) — Presidents George Bush and Vladimir Putin issued a "Declaration on Nuclear Energy and Nonproliferation" on July 3 from their historic "Lobster Summit" in Kennebunkport, Maine, as part of the agreement to improve cooperation between the world's two leading powers. The Declaration calls for increasing the levels of joint cooperation on nuclear technology, and in particular to assure enhanced access to nuclear power to the developing nations.

Lyndon LaRouche on July 6 offered his endorsement for the Declaration, and for a joint statement by U.S. Secretary of State Condoleezza Rice and Minister for Foreign Affairs of the Russian Federation Sergey Lavrov, issued also on July 3, regarding the reduction of strategic offensive forces pursuant to Article VI of the Non-Proliferation Treaty. LaRouche encouraged people to give efficient support for these important measures.

Leaders of all nations must acknowledge the on going financial collapse as manifested by the dramatic deterioration of the global economy and the US Dollar itself. This realization and the increasing threats of nuclear war should precipitate a decision to collectively embark on major infrastructure projects benefiting all people of all nations. The tragedy of our times is not so much the suffering of whole populations

as a result of evil minds conspiring, but the absence of courage and intellectual capacity on the part of decision makers in government, in business and the academe, to reject what is wrong and to do what is right.

This conference initiated by the Chamber of Commerce of the Philippines Foundation (CCPF) has far greater implications than just becoming an information gathering, roundtable discussion. It is our hope that our country's forthcoming decision to join the rest of the world in nuclear power development programs, will necessarily lead our own leaders to reconsider our national economic policy to give the assurances that future generations of Filipinos be given the opportunity of a quality of life which all humans deserve.

Postscript:

The day after the CCPF initiated the historic conference to make known to the Philippine public, through relevant agencies of government, the private sector, and the academe, its determination to pursue a national program of nuclear energy development, an agreement and declaration made by the Presidents of the two superpowers, President Vladimir Putin of Russia and President George W. Bush, was made public. The joint declaration expressed their commitment to make nuclear technology available to developing countries around the world and to provide assistance in constructing the same to those who would want it, and help in the financing constraints to make such capability affordable. They further commit to support the IAEA objectives and abide by the Non-Proliferation Treaty in order that such technology shall not be used for the production of weapons of mass destruction.

It should be noted that this joint declaration not only has great historical significance, but unique in its substance and purpose. If indeed this commitment of the leaders of the two most powerful nations in the world is followed through, the attention of the world would inevitably focus in building and improving present civilization and not on its destruction. For the first time in four decades of continuous deterioration, the world's developing countries are presented with the initial manifestations of a ray of hope. It is every citizen's duty to acknowledge and endorse the full implementation of this Joint Declaration if we are to avoid political and economic disintegration.

KATIPUNAN NG DEMOKRATIKONG PILIPINO

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